

Technical Data

4000 Series

Diesel Engine - Electropak

4008TAG1A

4008TAG2A

Emission Compliant engines

Basic technical data

Number of cylinders 8
 Cylinder arrangement In line
 Cycle 4 stroke, compression ignition
 Induction system Turbocharged
 Compression ratio 13.6:1 nominal
 Bore 160 mm
 Stroke 190 mm
 Cubic capacity 30,561 litres
 Direction of rotation Anti-clockwise viewed on flywheel
 Firing order 1, 4, 7, 6, 8, 5, 2, 3
 Cylinder 1 furthest from flywheel

Weight of Electropak

Temperate

Dry 4270 kg
 Wet 4558 kg

Tropical

Dry 4320 kg
 Wet 4618 kg

Overall dimensions of Electropak

Temperate

Length 3852 mm
 Width 2046 mm
 Height 2067 mm

Tropical

Length 3711 mm
 Width 2046 mm
 Height 2146 mm

Moment of inertia

-engine 9,60 kgm²
 -flywheel 6,02 kgm²

Cyclic irregularity for engine/flywheel (Prime power)

4008TAG1A 1,195
 4008TAG2A 1,180

Ratings

Steady state speed stability at constant load ± 0.25%
 Electrical rating are based on average alternator efficiency and are for guidance only (0.8 power factor being used).

Operating point

Engine speed 1500 rev/min
 Static injection timing See engine
 Cooling water exit temperature < 98 °C

Fuel data

To conform to BS2869 class A2 or BS EN590.

Performance

Sound pressure level 1500 rev/min 108 / 109 dB(A)

Note: All data based on operation to ISO 3046 / 1, BS 5514 and DIN 6271 standard reference conditions.

For engines operating in ambient conditions other than the standard reference conditions stated below a suitable de-rate must be applied. De-rate tables for increased ambient temperature and/or altitude are available, please contact Perkins Applications Department.

Test conditions

Air temperature 25 °C
 Barometric pressure 100 kPa
 Relative humidity 30%
 Air inlet restriction at maximum power (nominal) 2,5 kPa
 Exhaust back pressure (nominal) 3,0 kPa

General installation

4008TAG1A - Tropical

Designation	Units	Spill timing 16° (no retard)		
		Baseload power	Prime power	Standby power
Gross engine power	kWb	644	805	882
Fan power	kWm	38		
Net engine power	kWm	602	767	844
BMEP gross	bar	16,6	20,7	22,7
Combustion air flow	m³/min	58	69,4	74
Exhaust gas temperature, after turbo	°C	405	425	440
Exhaust gas flow maximum, after turbo	m³/min	183		
Boost pressure ratio	-	2,9	3,45	3,65
Mechanical efficiency	%	88	91	92
Overall thermal efficiency	%	41,5	41	40
Friction power and pumping losses	kWm	80		
Mean piston speed	m/s	9,5		
Engine coolant flow, minimum	l/s	10		
Typical Genset electrical output 0.8pf 25 °C (100 kPa)	kVA	720	911	1002
	kWe	576	728	802
Assumed alternator efficiency	%	95		

4008TAG1A - Temperate

Designation	Units	Spill timing 16° (no retard)		
		Baseload power	Prime power	Standby power
Gross engine power	kWb	644	805	882
Fan power	kWm	27		
Net engine power	kWm	617	778	855
BMEP gross	bar	16,6	20,7	22,7
Combustion air flow	m³/min	58	69,4	74
Exhaust gas temperature, after turbo	°C	405	425	440
Exhaust gas flow maximum, after turbo	m³/min	183		
Boost pressure ratio	-	2,9	3,45	3,65
Mechanical efficiency	%	88	91	92
Overall thermal efficiency	%	41,5	41	40
Friction power and pumping losses	kWm	80		
Mean piston speed	m/s	9,5		
Engine coolant flow, minimum	l/s	10		
Typical Genset electrical output 0.8pf 25 °C (100 kPa)	kVA	733	923	1015
	kWe	586	739	812
Assumed alternator efficiency	%	95		

General installation

4008TAG2A - Tropical

Designation	Units	Spill timing 14°		
		Baseload power	Prime power	Standby power
Gross engine power	kWb	719	899	962
Fan power	kWm	38		
Net engine power	kWm	681	861	924
BMEP gross	bar	18,5	23,2	24,7
Combustion air flow	m ³ /min	64	75	77
Exhaust gas temperature, after turbo	°C	405	450	485
Exhaust gas flow maximum, after turbo	m ³ /min	195		
Boost pressure ratio	-	-	3,76	4,1
Mechanical efficiency	%	-	92	92
Overall thermal efficiency	%	-	39	37
Friction power and pumping losses	kWm	80		
Mean piston speed	m/s	9,5		
Engine coolant flow, minimum	l/s	10		
Typical Genset electrical output 0.8pf 25 °C (100 kPa)	kVA	809	1022	1093
	kWe	647	818	874
Assumed alternator efficiency	%	95		

4008TAG2A - Temperate

Designation	Units	Spill timing 14°		
		Baseload power	Prime power	Standby power
Gross engine power	kWb	719	899	962
Fan power	kWm	27		
Net engine power	kWm	692	872	935
BMEP gross	bar	18,5	23,2	24,7
Combustion air flow	m ³ /min	64	75	77
Exhaust gas temperature, after turbo	°C	405	450	486
Exhaust gas flow maximum, after turbo	m ³ /min	198		
Boost pressure ratio	-	-	3,76	4,1
Mechanical efficiency	%	-	92	92
Overall thermal efficiency	%	-	39	37
Friction power and pumping losses	kWm	80		
Mean piston speed	m/s	9,5		
Engine coolant flow, minimum	l/s	10		
Typical Genset electrical output 0.8pf 25 °C (100 kPa)	kVA	821	1036	1110
	kWe	657	829	888
Assumed alternator efficiency	%	95		

Note: Not to be used for CHP design purposes. (Indicative figures only.) Consult Perkins Engines Company Limited. Assumes complete combustion.

Continuous Baseload rating: Power available for continuous full load operation.

Prime Power rating is available for unlimited hours per year with a variable load of which the average engine load factor is 80% of the published power rating, incorporation of a 10% overload for 1 hour in every 12 hours of operation which is permitted.

Standby Power rating is for the supply of emergency power at variable load for the duration of the non-availability of the mains power supply. NO OVERLOAD capacity is available at this rating. Engines must not be allowed to have facilities for parallel operation with the mains supply. This rating should be applied only when reliable mains power is available. Should this not be the case then refer to Prime Power rating. A Standby rated engine should be sized for an average load factor of 80% based on published standby rating for 500 operating hours per year. Standby ratings should never be applied except in true emergency power failure conditions.

Energy balance

Note: Not to be used for CHP design purposes. (Indicative figures only). Consult Perkins Engines Company Limited. Assumes complete combustion.

4008TAG1A - Tropical - spill timing 16°

Designation	Units	Baseload power	Prime power	Standby power
Energy in fuel	kWt	1544	1957	2191
Energy in power output (gross)	kWb	644	805	882
Energy to cooling fan	kWm		38	
Energy in power output (net)	kWm	606	767	844
Energy to exhaust	kWt	492	606	712
Energy to coolant and oil	kWt	245	300	313
Energy to radiation	kWt	30	70	91
Energy to charge coolers	kWt	133	176	193

4008TAG1A - Temperate - spill timing 16°

Designation	Units	Baseload power	Prime power	Standby power
Energy in fuel	kWt	1544	1957	2191
Energy in power output (gross)	kWb	644	805	882
Energy to cooling fan	kWm		27	
Energy in power output (net)	kWm	617	778	855
Energy to exhaust	kWt	492	606	712
Energy to coolant and oil	kWt	245	300	313
Energy to radiation	kWt	30	70	91
Energy to charge coolers	kWt	133	176	193

4008TAG2A - Tropical - spill timing 14°

Designation	Units	Baseload power	Prime power	Standby power
Energy in fuel	kWt	1733	2273	2504
Energy in power output (gross)	kWb	719	899	962
Energy to cooling fan	kWm		38	
Energy in power output (net)	kWm	681	861	924
Energy to exhaust	kWt	548	688	795
Energy to coolant and oil	kWt	273	316	331
Energy to radiation	kWt	40	80	100
Energy to charge coolers	kWt	153	290	316

4008TAG2A - Temperate - spill timing 14°

Designation	Units	Baseload power	Prime power	Standby power
Energy in fuel	kWt	1733	2273	2504
Energy in power output (gross)	kWb	719	899	962
Energy to cooling fan	kWm		27	
Energy in power output (net)	kWm	692	872	935
Energy to exhaust	kWt	548	688	795
Energy to coolant and oil	kWt	273	316	331
Energy to radiation	kWt	40	80	100
Energy to charge coolers	kWt	153	290	316

Cooling system

Recommended coolant: 50% inhibited ethylene glycol or 50% inhibited propylene glycol and 50% clean fresh water. For combined heat and power systems and where there is no likelihood of ambient temperature below 10 °C, then clean 'soft' water may be used, treated with 1% by volume of Perkins inhibitor in the cooling system.

Nominal jacket water pressure in crankcase. 170 kPa

The following is a guide based on ambient air conditions of 50 °C on a Perkins supplied radiator.

Total coolant capacity

Engine only 48 litres

ElectropaK (engine/radiator):

-tropical 149 litres

-temperate 143 litres

Pressure cap setting 69 kPa

Fan Incorporated in radiator

Diameter:

-tropical 1400 mm (pusher)

-temperate 1214 mm (pusher)

Ambient cooling clearance (open ElectropaK Prime power) based on air temperature at fan 3 °C above ambient.

Maximum additional restriction (duct allowance) to cooling airflow (Prime power applications) and resultant minimum airflow.

	Ambient clearance 50% glycol	Duct allowance mm H ₂ O	Min airflow m ³ /min
4008TAG1A - Tropical	50 °C	20	1248
4008TAG1A - Temperate	41 °C	24	1095
4008TAG2A - Tropical	50 °C	18	1350
4008TAG2A - Temperate	35 °C	25	1095

Coolant pump speed 1,4 x e rev/min

Method of drive Gear driven

Maximum static pressure head on pump

above engine crank centre line 7 m

Maximum external permissible restriction

to coolant pump flow 20 kPa

Thermostat operating range 71-85 °C

Shutdown switch setting 101 °C rising

Coolant immersion heater capacity 4 kW x 1

Jacket cooling water data	Units	
Coolant flow 4008TAG1A/2A	l/s	10
Coolant exit temperature (max)	°C	98
Coolant entry temperature (min)	°C	70
Coolant entry temperature (max)	°C	86

Lubrication system

Recommended lubricating oil to conform with the specification of API CG4

Lubricating oil capacity

-sump maximum 153 litres

-sump minimum 127 litres

Lubricating oil temperature maximum to bearings 105 °C

Lubricating oil pressure

-at 80 °C temperature to bearing gallery (minimum) 0,34 MPa

Oil consumption Prime power

4008TAG1A

Oil consumption Prime power	Units	
After running-in ⁽¹⁾	g/kWhr	0,50
Oil flow rate from pump	l/s	3,70

1. Typical after 250 hours

4008TAG2A

Oil consumption Prime power	Units	
After running-in ⁽¹⁾	g/kWhr	0,52
Oil flow rate from pump	l/s	3,70

1. Typical after 250 hours

Sump drain plug tapping size G1

Oil pump speed and method of drive 1.4 x e rev/min, gear driven

Shutdown switch setting 1,93 bar falling

Normal operating angles

Front and rear 5°

Side tilt 10°

Fuel system

Recommended fuel to conform to:

... BS2869 1998 Class A2 or BS EN590
 Type of injection system ... Direct injection
 Fuel injection pump ... Combined unit injector
 Fuel injector ... Combined unit injector
 Fuel injector opening pressure... 234 bar
 Fuel lift pump . Tuthill TCH 1-054
 Delivery/hour at 1500 rev/min ... 660 litres
 Heat retained in fuel to tank ... 4,5 kW
 Temperature of fuel at lift pump to be less than. ... 58 °C
 Fuel lift pump pressure ... 300 kPa
 Fuel lift pump maximum suction head ... 2,5 m
 Fuel lift pump maximum pressure head ... See Installation Manual
 Fuel filter spacing... 10 microns
 Governor type ... Electronic
 Torque at the governor output shaft... 0,917 kgm
 Static injection timing . See engine number plate
 Tolerance on fuel consumption... To ISO 8528-1 1993

Fuel consumption gross

4008TAG1A - Tropical

Designation	g/kWh	Litres/hr
At Standby Max power rating	210	218
At Prime Power rating	206	195
At Continuous Baseload rating	203	154
At 75% of Prime Power rating	201	143
At 50% of Prime Power rating	207	98
At 25% of Prime Power rating	217	52

4008TAG1A - Temperate

Designation	g/kWh	Litres/hr
At Standby Max power rating	210	218
At Prime Power rating	206	195
At Continuous Baseload rating	203	154
At 75% of Prime Power rating	201	143
At 50% of Prime Power rating	207	98
At 25% of Prime Power rating	217	52

4008TAG2A - Tropical

Designation	g/kWh	Litres/hr
At Standby Max power rating	221	286
At Prime Power rating	214	226
At Continuous Baseload rating	205	175
At 75% of Prime Power rating	203	163
At 50% of Prime Power rating	206	109
At 25% of Prime Power rating	218	59

4008TAG2A - Temperate

Designation	g/kWh	Litres/hr
At Standby Max power rating	221	286
At Prime Power rating	214	226
At Continuous Baseload rating	205	175
At 75% of Prime Power rating	203	163
At 50% of Prime Power rating	206	109
At 25% of Prime Power rating	218	59

Induction system

Maximum air intake restriction of engine:

-clean filter... 127 mm H₂O
 -dirty filter. ... 380 mm H₂O
 -air filter type ... 5001-00-00 MF&T

Exhaust system

Maximum back pressure for total system.

4008TAG1A. ... 947 mm H₂O
 4008TAG2A. ... 816 mm H₂O
 Exhaust outlet flange size ... 2 x 152 mm
 For recommended pipe sizes, refer to the Installation Manual.

Electrical system

Type ... Insulated return
 Alternator ... 24 volts with integral regulator
 Alternator output... 40 amps at 28 volts at 20 °C ambient
 Starter motor ... 24 volts
 Starter motor power. ... 8,2 kW
 Number of teeth on flywheel ... 190
 Number of teeth on starter motor ... 12
 Minimum cranking speed (0 °C)... 120 rev/min
 Pull-in current of starter motor solenoid ... 30 amps at 24 volts
 Hold-in current of starter motor solenoid ... 9 amps at 24 volts
 Engine stop solenoid ... 24 volts
 Pull-in current of stop solenoid ... 60 amps at 24 volts
 Hold-in current of stop solenoid... 1,1 amps at 24 volts

Engine mounting

Position of centre of gravity (wet engine) forward from rear face of crankcase ... 900 mm
 Engine vertical centre line above crankshaft centre line ... 140 mm
 Maximum additional load applied to flywheel due to all rotating components. ... 650 Kg

Starting requirements

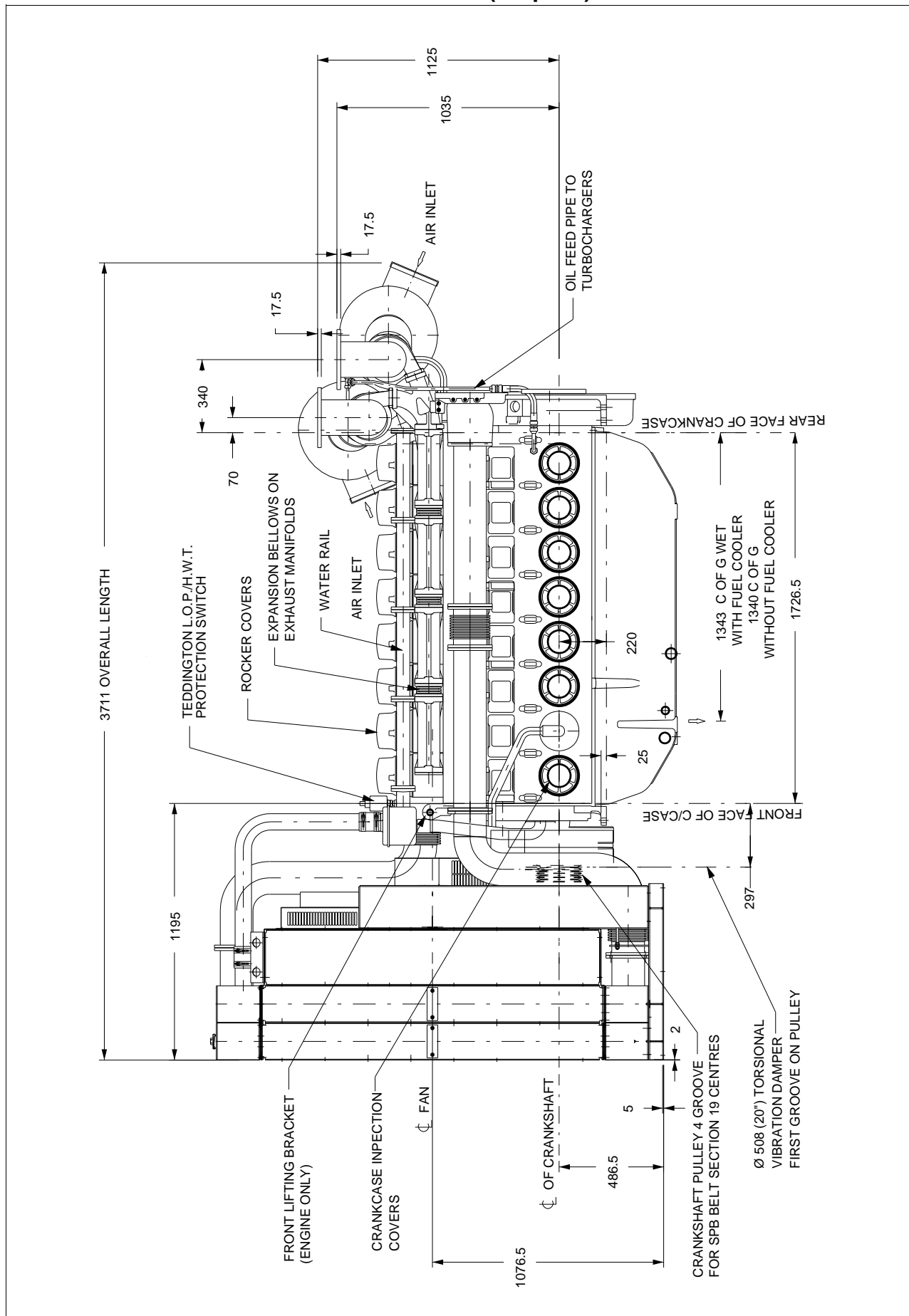
Temperature range down to 0 °C (32 °F)

Oil ... API CG4 15W/40
 Starter... 1 x 24V
 Battery. ... 2 x 12 volts x 178 Ah
 Max breakaway current... 1400 amps
 Cranking current... 750 amps
 Aids ... Not necessary
 Starter cable size. ... 70 mm²
 Maximum length... 6 m

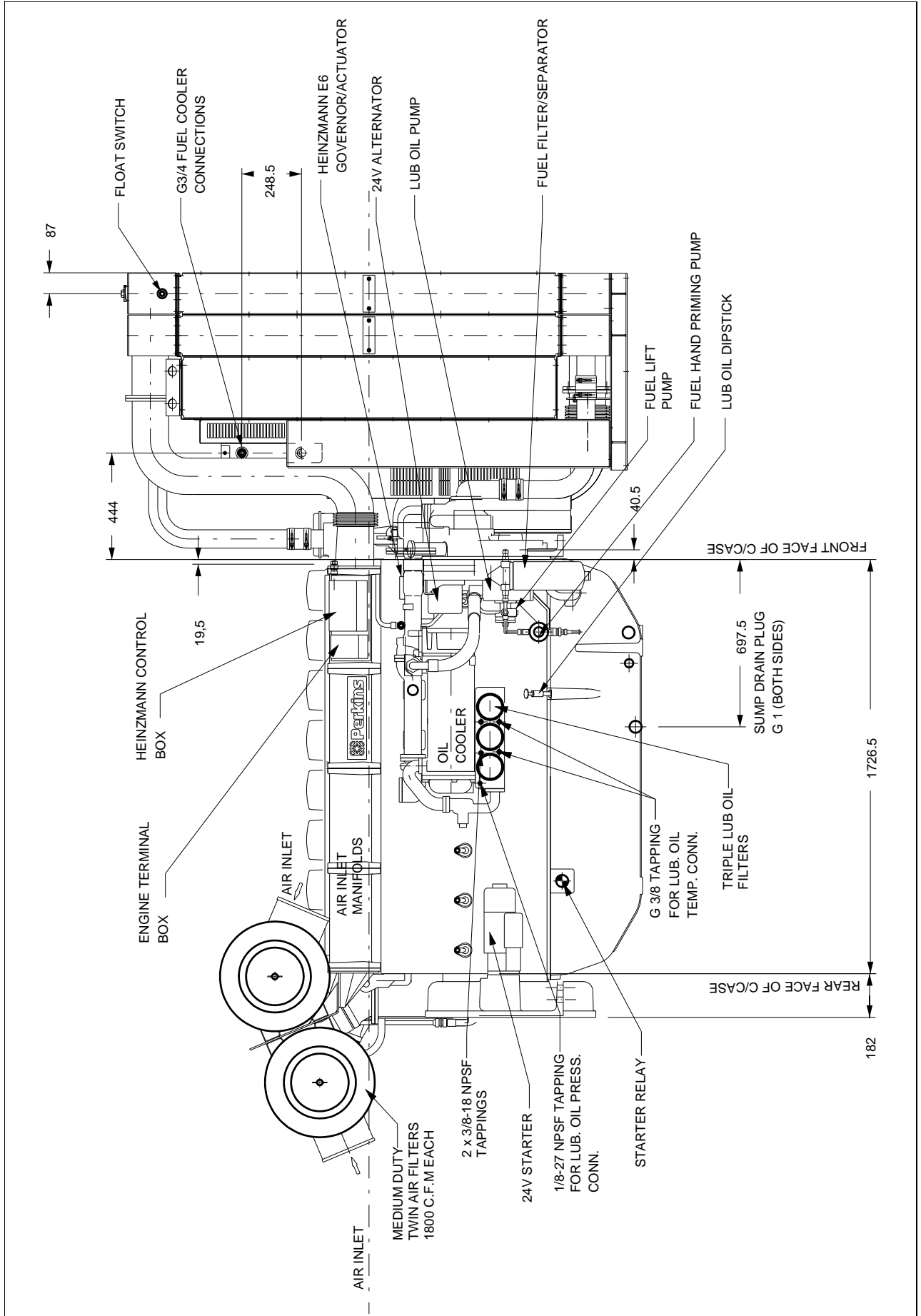
Notes:

- Battery capacity is defined by the 20 hour rate at 0 °C.
- The oil specification should be for the minimum ambient temperature as the oil will not be warmed by the immersion heater.
- Breakaway current is dependant on battery capacity available. Cables should be capable of handling transient current which may be up to double the steady cranking current.

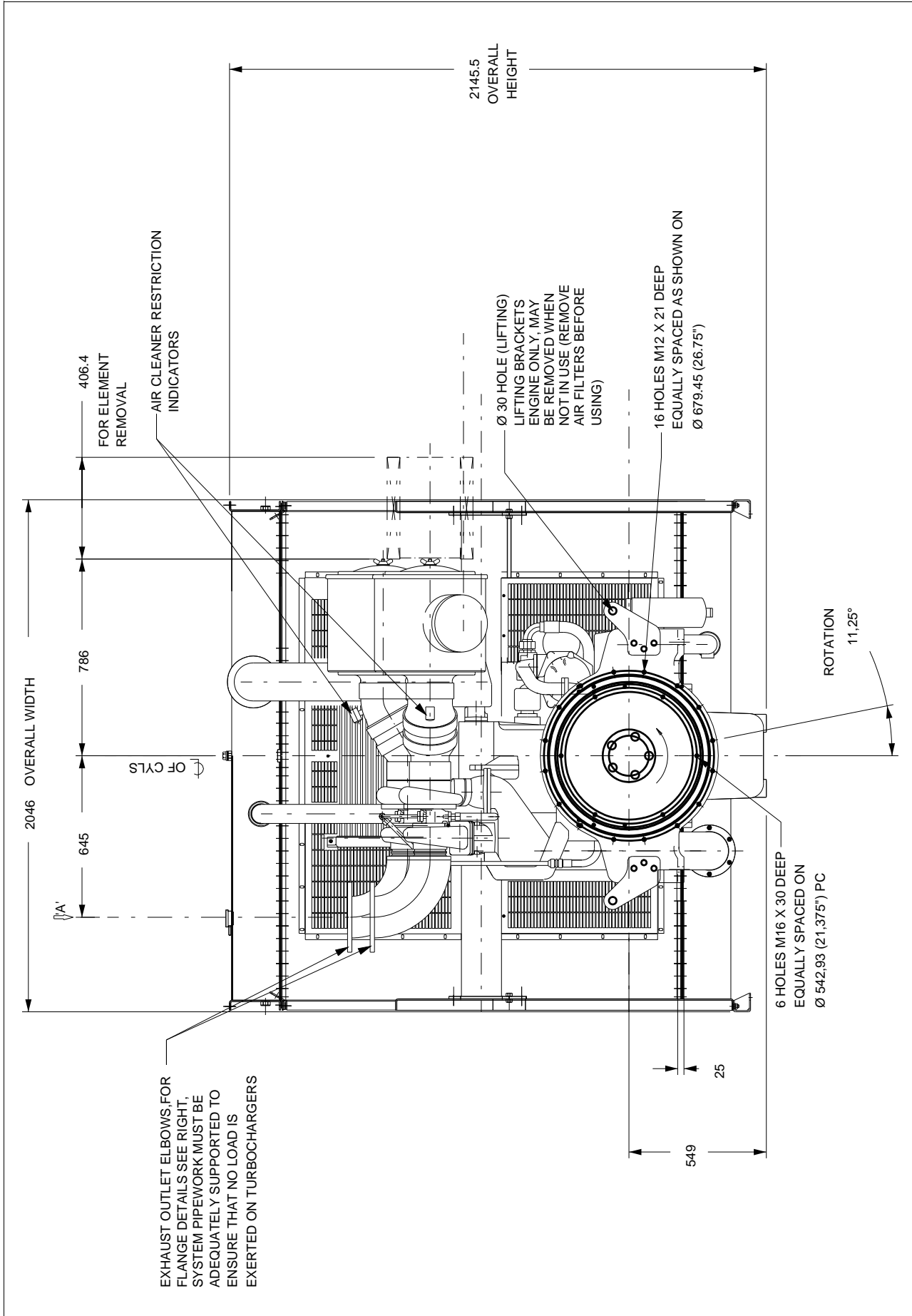
4008TAG1A and 4008TAG2A - left hand side (Tropical)



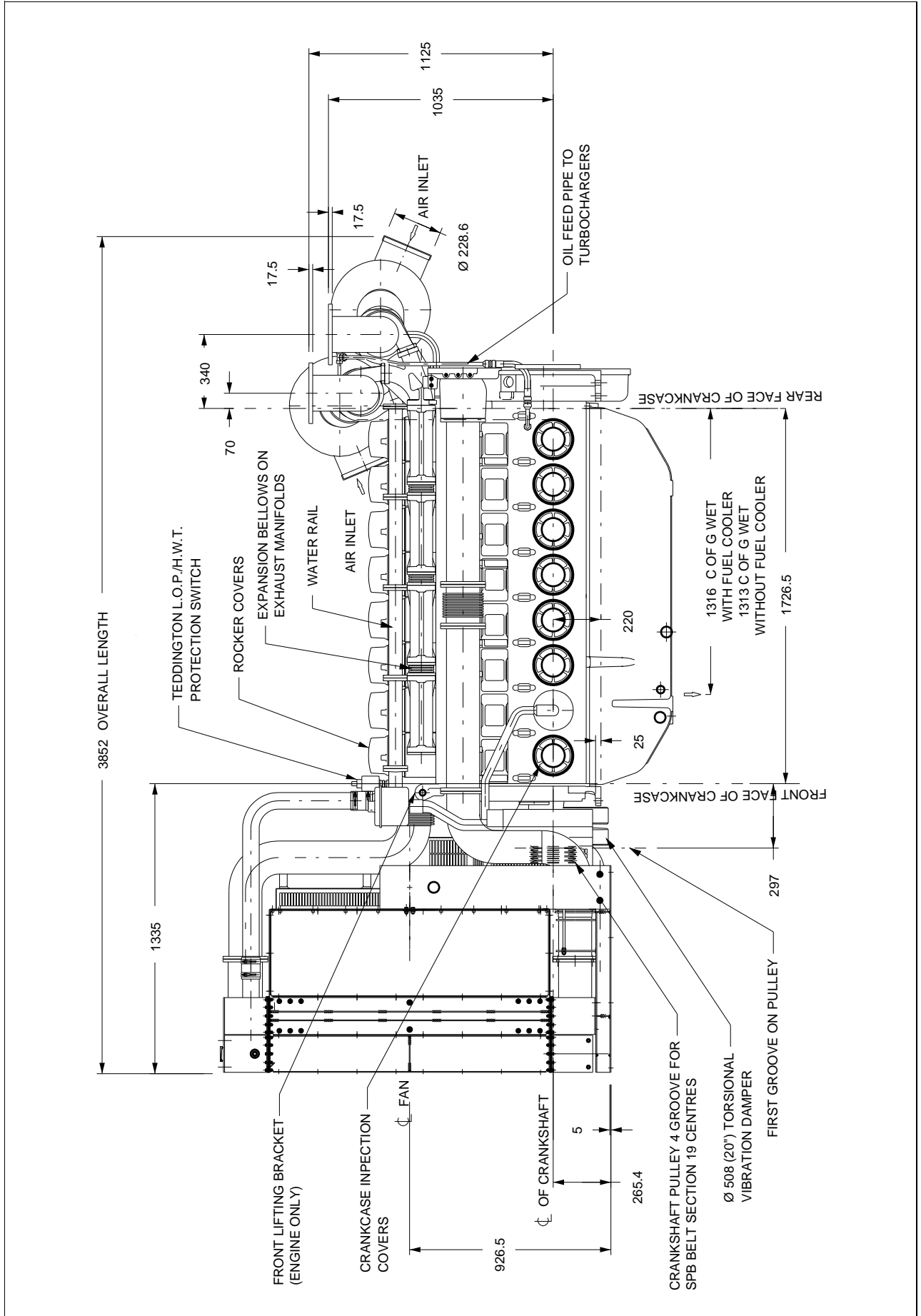
4008TAG1A and 4008TAG2A - right hand side (Tropical)



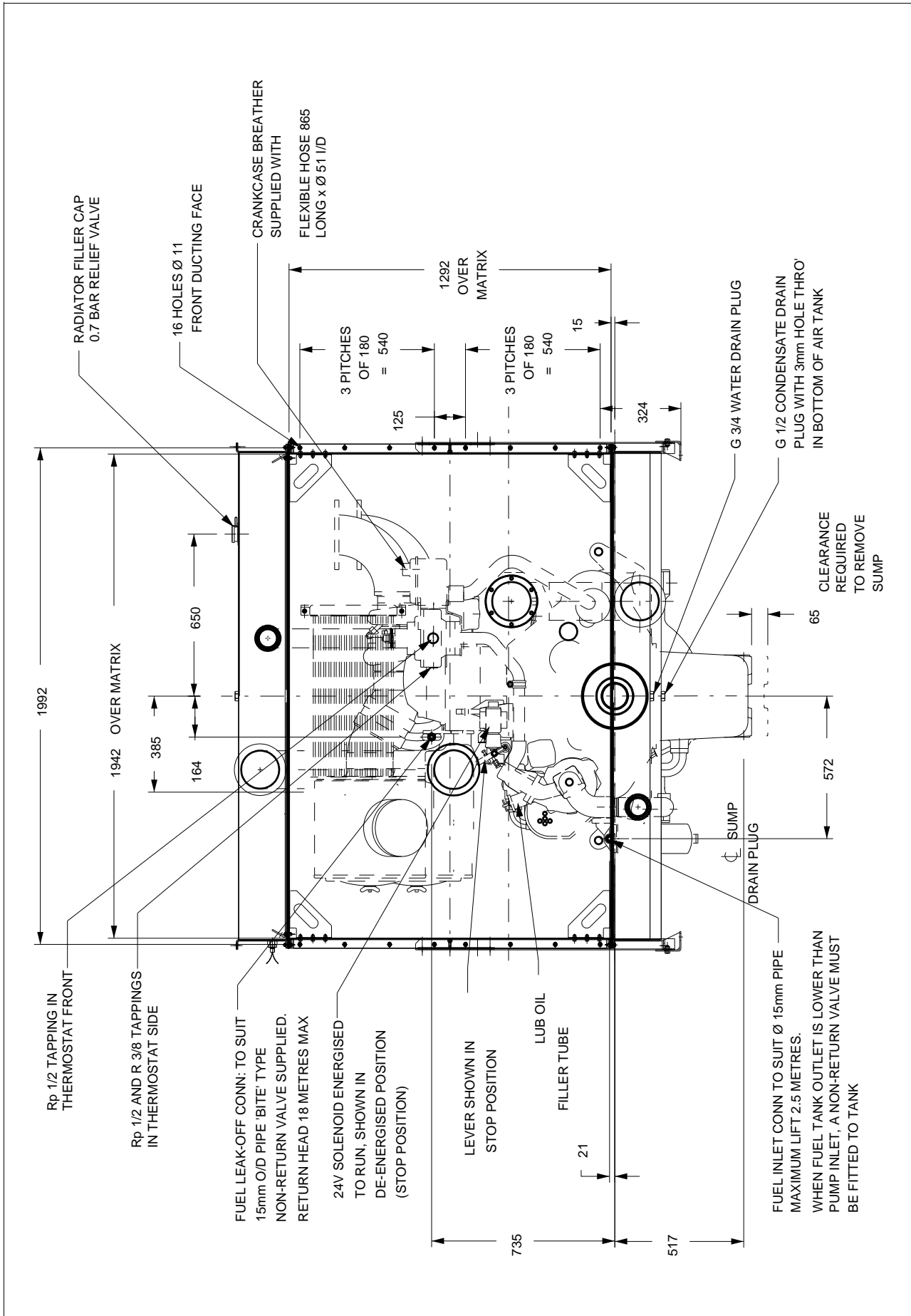
4008TAG1A and 4008TAG2A - rear (Tropical)



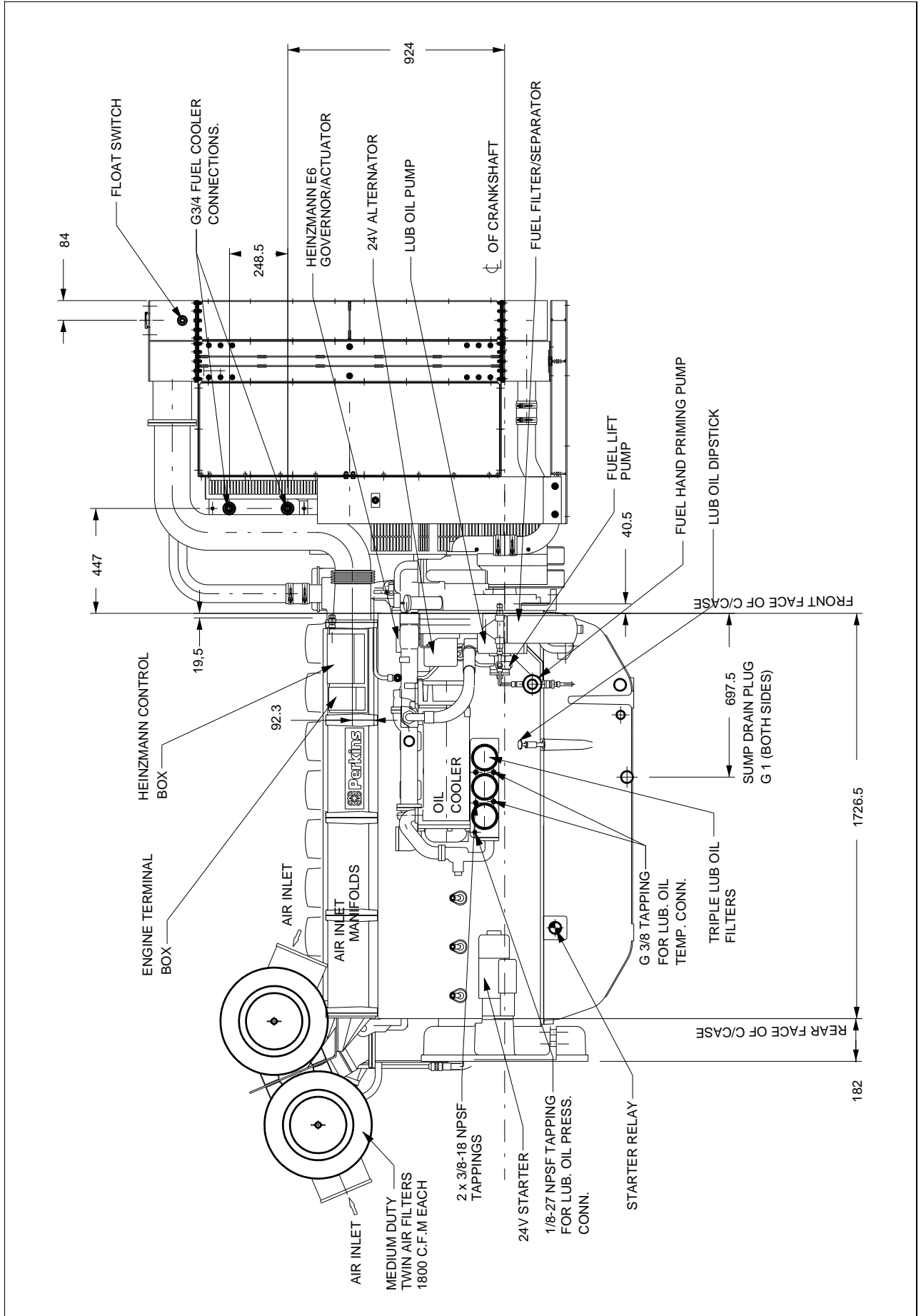
4008TAG1A and 4008TAG2A - left hand side (Temperate)



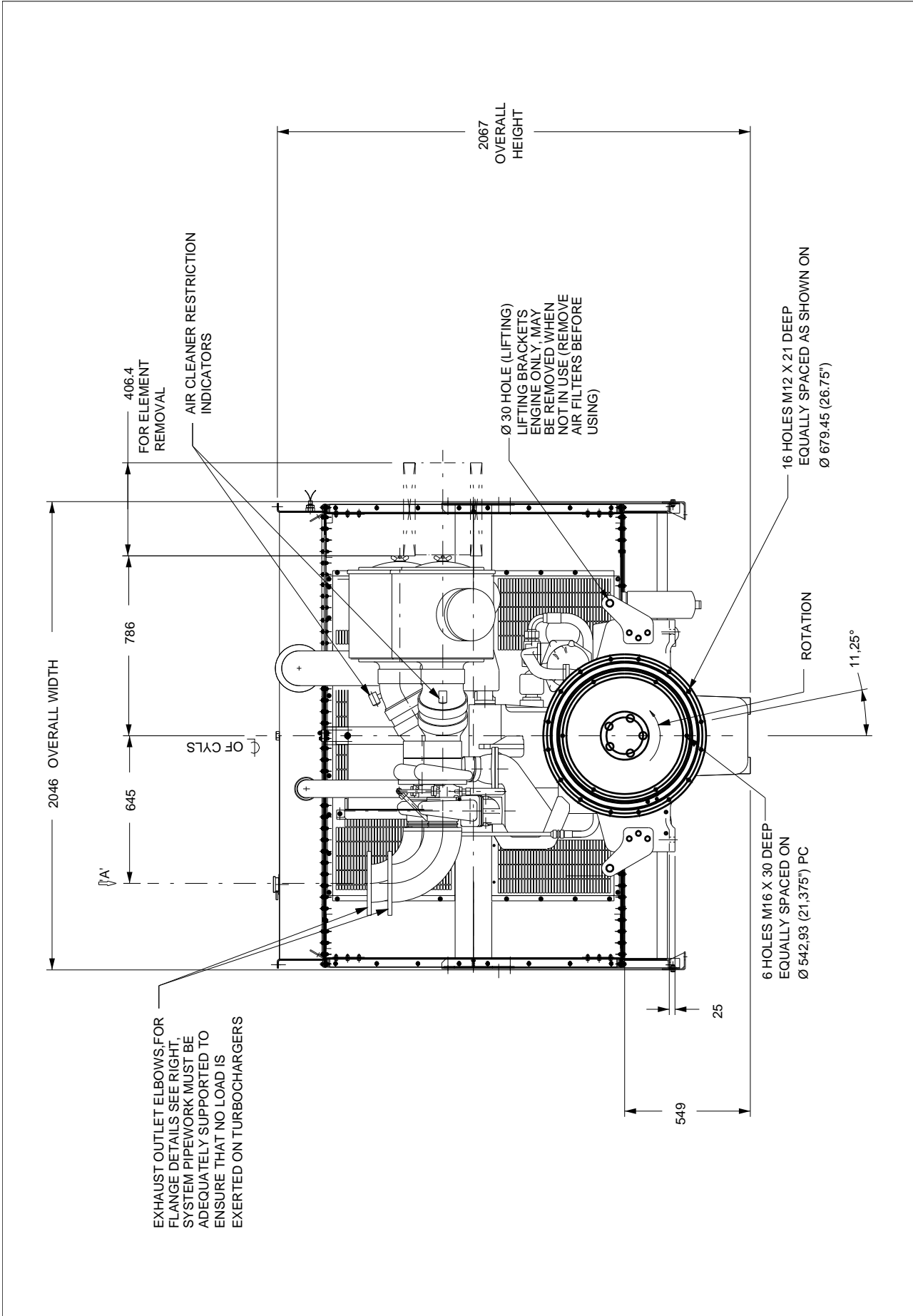
4008TAG1A and 4008TAG2A - front (Temperate)



4008TAG1A and 4008TAG2A - right hand side (Temperate)



4008TAG1A and 4008TAG2A - rear (Temperate)



Typical load acceptance (cold)

4008TAG1A

Initial Load Acceptance When engine reaches rated speed (15 seconds maximum after engine starts to crank)				2nd Load Application Immediately after engine has recovered to rated speed (5 seconds after initial load application)			
Prime Power %	Load kWm (kWe) Nett	Transient Frequency Deviation %	Frequency recovery time seconds	Prime Power %	Load kWm (kWe) Nett	Transient Frequency Deviation %	Frequency recovery time seconds
64	493 / 469	≤ - 10	5	36	274 / 259	≤ - 10	5

4008TAG2A

Initial Load Acceptance When engine reaches rated speed (15 seconds maximum after engine starts to crank)				2nd Load Application Immediately after engine has recovered to rated speed (5 seconds after initial load application)			
Prime Power %	Load kWm (kWe) Nett	Transient Frequency Deviation %	Frequency recovery time seconds	Prime Power %	Load kWm (kWe) Nett	Transient Frequency Deviation %	Frequency recovery time seconds
57	490 / 466	≤ - 10	5	43	371 / 352	≤ - 10	5

The above complies with the requirements of Classification 3 & 4 of ISO 8528-12 and G2 operating limits stated in ISO 8528-5.

The above figures were obtained under test conditions as follows:

Engine block temperature 45 °C

Alternator efficiency 96%

Minimum ambient temperature 10 °C

Isochronous governing

Under frequency roll off (UFRO) set to 1 Hz below rated frequency

Typical alternator inertia 50 Kg^m

All tests were conducted using an engine installed and serviced to Perkins Engines Company Limited recommendations.

Emissions chart

4008TAG1A

Spill timing 16°					
Rating	German TA-Luft Limit 1 -3 MW	German ½ TA- Luft @ >3 MW	German TA-Luft Limit @ >3 MW	French Limits 2000 @ <500 hours/year	French Limits 1500 @ >500 hours/year
Baseload	Yes	No	N/A	No	No
Prime power	Yes	No	N/A	No	No
Standby	Yes	No	N/A	No	No

4008TAG2A

Spill timing 14°					
Rating	German TA-Luft Limit 1 -3 MW	German ½ TA- Luft @ >3 MW	German TA-Luft Limit @ >3 MW	French Limits 2000 @ <500 hours/year	French Limits 1500 @ >500 hours/year
Baseload	Yes	No	N/A	No	No
Prime power	Yes	Yes	N/A	Yes	No
Standby	Yes	Yes	N/A	Yes	No

